Notice of Allowability	Application No.	Applicant(s)	
	09/895,865	SWANSON, GARY J.	
	Examin r	Art Unit	
	John Juba, Jr.	2872	AJ

-- The MAILING DATE of this communication appears on the cov r sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to RCE with amendment filed 03/01/2004.

2. ☒ The allowed claim(s) is/are 1-8,11-16,18-23 and 25-38.

3. ☒ The drawings filed on 28 September 2001 are accepted by the Examiner.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. ______ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: ______.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
   1) ☐ hereto or 2) ☐ to Paper No./Mail Date ______.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date ______.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date ______
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☒ Interview Summary (PTO-413), Paper No./Mail Date ______ .
7. ☒ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other ______.

Examiner's Amendment

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. N. Scott Pierce on May 17, 2004.

<u>In the claims</u>:

Claims 11, 12, 16, 25, and 26 have been amended as shown in the appended consolidated listing, which listing will replace all prior versions of the claims in the application.

Interview Summary

On May 17, 2004, Examiner Juba contacted Mr. N. Scott Pierce to explain that the elements recited in claims 11, 12, 25 and 26 were recited in such an order that did not provide antecedent basis for some of the expression used therein. The examiner further noted that all of the variables recited in the equations of claims 11 and 12 were not defined in the claims. The examiner noted that the preamble of claim 16 was not consistent with that of its base claim, and noted a grammatical informality in line 4 of claim 26. Applicant's representative agreed to specific changes to claims 11, 12, 16, 25, and 26 as would overcome these informalities, and authorized that the changes be entered by examiner's amendment.

Post-allowance papers should be mailed to ***Box Issue Fee***. Post-allowance papers may also be faxed to correspondence branch in PUBs. The fax number is (703) 308-5083. The ***PUBs customer service*** number is (703) 305-8497.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Juba whose telephone number is (571) 272-2314. The examiner can normally be reached on Mon.-Fri. 9 - 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Drew Dunn can be reached on Mon.- Thu., 9 - 5.

JOHN JUBA, JR.
PRIMARY EXAMINER
Art Unit 2872

May 16, 2004

1. (Previously Presented) A method for displaying a color image comprising the steps of:

illuminating a multilevel optical phase element with a light source having a plurality of wavelengths of interest, said multilevel phase element dispersing each wavelength of interest from said light source by diffraction into a plurality of diffraction orders and projecting the dispersed light onto an imaging plane; and actuating a light modulating display in the imaging plane having a plurality of pixel elements, each said pixel element assigned to transmit a predetermined spectral region, positioned within the near field region of said multilevel optical phase element so as to receive said dispersed and projected light from said multilevel phase element.

2. (Previously Presented) The method of claim 1 wherein said display is positioned at a distance Z from said multilevel optical phase element, wherein Z is determined by the relationship:

$$\frac{2T^2}{3\lambda_{long}} < Z < \frac{2T^2}{3\lambda_{short}}$$

wherein T is the periodicity of said multilevel optical phase element , λ_{long} is the largest wavelength of said plurality of wavelengths of interest and λ_{short} is the shortest wavelength of said plurality of wavelengths of interest.

3. (Previously Presented) The method of claim 1 further comprising providing a light source having a polychromatic spectrum.

4. (Previously Presented) The method of claim 1 further comprising providing a plurality of subsources each subsource having a different spectral distribution.

5. (Previously Presented) The method of claim 4 further comprising emitting light from each said subsource with a light emitting diode.

6. (Previously Presented) The method of claim 4 further comprising providing a laser as each said subsource.

7. (Previously Presented) The method of claim 1 further comprising providing a multilevel optical phase element that is multilevel in two orthogonal directions.

8. (Previously Presented) The method of claim 1 wherein said display is positioned at a distance *Z* from said multilevel optical phase element, wherein *Z* is determined by the relationship:

$$\frac{T^2}{3\lambda_{long}} < Z < \frac{T^2}{3\lambda_{short}}$$

wherein T is the periodicity of said multilevel optical phase element, λ_{long} is the largest wavelength of said plurality of wavelengths of interest and λ_{short} is the shortest wavelength of said plurality of wavelengths of interest.

9. (Cancelled)

10 (Cancelled)

11. (Currently Amended) A method for displaying a color image comprising the steps of:

focusing light, from a light source having a plurality of wavelengths of interest, using a plurality of focusing elements, said plurality of focusing elements including a plurality of lenslets ;

illuminating a multilevel optical phase element with light focused by said plurality of focusing elements, said multilevel phase element dispersing each wavelength of interest from said plurality of focusing elements by diffraction into a plurality of diffraction orders and projecting the dispersed light onto an imaging plane; and

actuating a light modulating display in the imaging plane having a plurality of pixel elements, each said pixel element assigned to transmit a predetermined spectral region, so as to receive said dispersed light from said multilevel optical phase element,

[and] wherein said display is positioned at a distance Z from said multilevel optical phase element, wherein Z is determined by the relationship:

$$\frac{2T^2 Z_s}{3\lambda_{long} Z_s - 2T^2} < Z < \frac{2T^2 Z_s}{3\lambda_{short} Z_s - 2T^2}$$

wherein T is the periodicity of said multilevel optical phase element, Z_s is equal to the distance between said multilevel optical phase element and said lenslets minus the focal length of said lenslets, λ_{long} is the largest wavelength of said plurality of wavelengths of interest and λ_{short} is the shortest wavelength of said plurality of wavelengths of interest [;]

~~illuminating a multilevel optical phase element with light focused by said plurality of focusing elements, said multilevel phase element dispersing each wavelength of interest from said plurality of focusing elements by diffraction into a plurality of diffraction orders and projecting the dispersed light onto an imaging plane; and~~

~~actuating a light modulating display in the imaging plane having a plurality of pixel elements, each said pixel element assigned to transmit a predetermined spectral region, so as to receive said dispersed light from said multilevel optical phase element~~ .

12. (Currently Amended) A method for displaying a color image comprising the steps of:

focusing light, from a light source having a plurality of wavelengths of interest, using a plurality of focusing elements, said plurality of focusing elements including a plurality of lenslets ;

illuminating a multilevel optical phase element with light focused by said plurality of focusing elements, said multilevel phase element dispersing each wavelength of interest from said plurality of focusing elements by diffraction into a plurality of diffraction orders and projecting the dispersed light onto an imaging plane; and

actuating a light modulating display in the imaging plane having a plurality of pixel elements, each said pixel element assigned to transmit a predetermined spectral region, so as to receive said dispersed light from said multilevel optical phase element,

[and] wherein said display is positioned at a distance Z from said multilevel optical phase element, wherein Z is determined by the relationship:

$$\frac{T^2 Z_s}{3\lambda_{long} Z_s - 2T^2} < Z < \frac{T^2 Z_s}{3\lambda_{short} Z_s - 2T^2}$$

wherein T is the periodicity of said multilevel optical phase element; Z_s is equal to the distance between said multilevel optical phase element and said lenslets minus the focal length of said lenslets, λ_{long} is the largest wavelength of said plurality of wavelengths of interest and λ_{short} is the shortest wavelength of said plurality of wavelengths of interest [;]

~~illuminating a multilevel optical phase element with light focused by said plurality of focusing elements, said multilevel phase element dispersing each wavelength of interest from said plurality of focusing elements by diffraction into a plurality of diffraction orders and projecting the dispersed light onto an imaging plane; and~~

~~actuating a light modulating display in the imaging plane having a plurality of pixel elements, each said pixel element assigned to transmit a predetermined spectral region, so as to receive said dispersed light from said multilevel optical phase element~~ .

13. (Previously Presented) The method of claim 11 wherein said multilevel optical phase element is constructed such that a magnification produced by said plurality of lenslets produces a dispersion element substantially equal to the dimensions of each pixel element in said display.

14. (Previously Presented) The method of claim 13 wherein said magnification (*M*) is given by the equation:

$$M = 1 + \frac{Z}{Z_s}$$

wherein *T* is the periodicity of said multilevel optical phase element, and Z_s is equal to the distance between said multilevel optical phase element and said lenslets minus the focal length of said lenslets and *Z* is the distance between said multilevel optical phase element and said display.

15. (Previously Presented) A apparatus for displaying a color image comprising:

a light source emitting a plurality of wavelengths of interest;

a multilevel optical phase element positioned to receive light from said light source, said multilevel phase element dispersing each wavelength of interest from said

light source by diffraction into a plurality of diffraction orders and projecting the dispersed light onto an imaging plane; and

a light modulating electronic display positioned in the imaging plane and having a plurality of pixel elements, each said pixel element assigned to transmit a predetermined spectral region, positioned within the near field region of said multilevel optical phase element so as to receive said dispersed light from said multilevel phase element.

16. (Currently Amended) The [system] <u>apparatus</u> of claim 15 wherein said display is positioned at a distance *Z* from said multilevel optical phase element, wherein *Z* is determined by the relationship:

$$\frac{T^2}{3\lambda_{long}} < Z < \frac{T^2}{3\lambda_{short}}$$

wherein *T* is the periodicity of said multilevel optical phase element, λ_{long} is the largest wavelength of said plurality of wavelengths of interest and λ_{short} is the shortest wavelength of said plurality of wavelengths of interest.

17. (Cancelled)

18. (Previously Presented) The apparatus of claim 15 wherein said display is positioned at a distance *Z* from said multilevel optical phase element, wherein *Z* is determined by the relationship:

$$\frac{T^2}{3\lambda_{long}} < Z < \frac{T^2}{3\lambda_{short}}$$

wherein T is the periodicity of said multilevel optical phase element , λ_{long} is the largest wavelength of said plurality of wavelengths of interest and λ_{short} is the shortest wavelength of said plurality of wavelengths of interest.

19. (Previously Presented) The apparatus of claim 16 wherein said light source has a polychromatic spectrum.

20. (Previously Presented) The apparatus of claim 15 wherein said light source comprises a plurality of subsources each subsource having a different spectral distribution.

21. (Previously Presented) The apparatus of claim 20 wherein each said subsource is a light emitting diode.

22. (Previously Presented) The apparatus of claim 20 wherein each said subsource is a laser.

23. (Previously Presented) The apparatus of claim 15 wherein said multilevel optical phase element is multilevel in two orthogonal directions.

24. (Cancelled)

25. (Currently Amended) An apparatus for displaying a color image comprising:

a light source having a plurality of wavelengths of interest [,] ;

a plurality of focusing elements positioned to focus light from said light source, said plurality of focusing elements including a plurality of lenslets ;

a multilevel optical phase element positioned to receive light focused by said plurality of focusing elements, said multilevel phase element dispersing each wavelength of interest from said plurality of focusing elements by diffraction into a plurality of diffraction orders and projecting the dispersed light onto an imaging plane; and

a light modulating electronic display positioned in the imaging plane and having a plurality of pixel elements, each said pixel element assigned to transmit a predetermined spectral region, positioned so as to receive said dispersed light from said multilevel optical phase element,

[and] wherein said display is positioned at a distance Z from said multilevel optical phase element, wherein Z is determined by the relationship:

$$\frac{2T^2 Z_s}{3\lambda_{long} Z_s - 2T^2} < Z < \frac{2T^2 Z_s}{3\lambda_{short} Z_s - 2T^2}$$

wherein T is the periodicity of said multilevel optical phase element, Z_s is equal to the distance between said multilevel optical phase element and said lenslets minus the focal length of said lenslets, λ_{long} is the largest wavelength of said plurality of

wavelengths of interest and λ_{short} is the shortest wavelength of said plurality of wavelengths of interest [;]

~~a plurality of focusing elements positioned to focus light from said light source;~~

~~a multilevel optical phase element positioned to receive light focused by said plurality of focusing elements, said multilevel phase element dispersing each wavelength of interest from said plurality of focusing elements by diffraction into a plurality of diffraction orders and projecting the dispersed light onto an imaging plane; and~~

~~a light modulating electronic display positioned in the imaging plane and having a plurality of pixel elements, each said pixel element assigned to transmit a predetermined spectral region, positioned so as to receive said dispersed light from said multilevel optical phase element~~ .

26. (Currently Amended) An apparatus for displaying a color image comprising:

a light source having a plurality of wavelengths of interest [,] ;

a plurality of focusing elements positioned to focus light from said light source, said plurality of focusing elements [~~comprises~~] including a plurality of lenslets ;

a multilevel optical phase element positioned to receive light focused by said plurality of focusing elements, said multilevel phase element dispersing each wavelength of interest from said plurality of focusing elements by diffraction into a plurality of diffraction orders and projecting the dispersed light onto an imaging plane; and

a light modulating electronic display positioned in the imaging plane and having a plurality of pixel elements, each said pixel element assigned to transmit a predetermined spectral region, positioned so as to receive said dispersed light from said multilevel optical phase element,

[and] wherein said display is positioned at a distance Z from said multilevel optical phase element, wherein Z is determined by the relationship:

$$\frac{T^2 Z_s}{3\lambda_{long} Z_s - 2T^2} < Z < \frac{T^2 Z_s}{3\lambda_{short} Z_s - 2T^2}$$

wherein T is the periodicity of said multilevel optical phase element, Z_s is equal to the distance between said multilevel optical phase element and said lenslets minus the focal length of said lenslets, λ_{long} is the largest wavelength of said plurality of wavelengths of interest and λ_{short} is the shortest wavelength of said plurality of wavelengths of interest [;]

~~a plurality of focusing elements positioned to focus light from said light source;~~

~~a multilevel optical phase element positioned to receive light focused by said plurality of focusing elements, said multilevel phase element dispersing each wavelength of interest from said plurality of focusing elements by diffraction into a plurality of diffraction orders and projecting the dispersed light onto an imaging plane; and~~

~~a light modulating electronic display positioned in the imaging plane and having a plurality of pixel elements, each said pixel element assigned to transmit a~~

~~predetermined spectral region, positioned so as to receive said dispersed light from said multilevel optical phase element~~ .

27. (Previously Presented) The apparatus of claim 25 wherein said multilevel optical phase element is constructed such that a magnification produced by said plurality of lenslets produces a dispersion element substantially equal to the dimensions of each pixel element in said display.

28. (Previously Presented) The apparatus of claim 25 wherein said magnification (*M*) is given by the equation:

$$M = 1 + \frac{Z}{Z_s}$$

wherein *T* is the periodicity of said multilevel optical phase element, *Z* is the distance between said multilevel optical phase element and said display and Z_s is equal to the distance between said multilevel optical phase element and said lenslets minus the focal length of said lenslets.

29. (Previously Presented) The apparatus of claim 25 wherein said multilevel optical phase element is multilevel in two orthogonal directions.

30. (Previously Presented) The apparatus of claim 25 wherein said light source comprises a plurality of subsources each subsource having a different spectral distribution.

31. (Previously Presented) The apparatus of claim 30 wherein each said subsource is a light emitting diode.

32. (Previously Presented) The apparatus of claim 30 wherein each said subsource is a laser.

33. (Previously Presented) The apparatus of claim 26 wherein said multilevel optical phase element is constructed such that a magnification produced by said plurality of lenslets produces a dispersion element substantially equal to the dimensions of each pixel element in said display.

34. (Previously Presented) The apparatus of claim 33 wherein said magnification (*M*) is given by the equation:

$$M = 1 + \frac{Z}{Z_s}$$

wherein *T* is the periodicity of said multilevel optical phase element, *Z* is the distance between said multilevel optical phase element and said display and Z_s is equal

to the distance between said multilevel optical phase element and said lenslets minus the focal length of said lenslets.

35. (Previously Presented) The apparatus of claim 26 wherein said multilevel optical phase element is multilevel in two orthogonal directions.

36. (Previously Presented) The apparatus of claim 25 wherein said light source comprises a plurality of subsources each subsource having a different spectral distribution.

37. (Previously Presented) The apparatus of claim 30 wherein each said subsource is a light emitting diode.

38. (Previously Presented) The apparatus of claim 30 wherein each said subsource is a laser.

John Juba
JOHN JUBA, JR.
PRIMARY EXAMINER